FEMA 209 390098 09

FLOOD INSURANCE STUDY

CITY OF BRECKSVILLE, OHIO

CUYAHOGA COUNTY

REVISED

NOVEMBER 15, 1989

Federal Emergency Management Agency

COMMUNITY NUMBER - 390098

NOTICE TO
FLOOD INSURANCE STUDY USERS

Communities participating in the National Flood Insurance Program have established repositories of flood hazard data for floodplain management and flood insurance purposes. This Flood Insurance Study may not contain all data available within the repository. It is advisable to contact the community repository for any additional data.

This publication incorporates revisions to the original Flood Insurance Study. These revisions are presented in Section 9.0.

TABLE OF CONTENTS

		Page
1.0	INTRODUCTION	1
1.1	Purpose of Study	1
1.2	Authority and Acknowledgments	1
1.3	Coordination	1
2.0	AREA STUDIED	2
2.1	Scope of Study	2
2.2	Community Description	2
2.3	Principal Flood Problems	4
2.4	Flood Protection Measures	5
3.0	ENGINEERING METHODS	5
3.1	Hydrologic Analyses	5
3.2	Hydraulic Analyses	6
4.0	FLOOD PLAIN MANAGEMENT APPLICATIONS	7
4.1	Flood Boundaries	7
4.2	Floodways	7
5.0	INSURANCE APPLICATION	10
5.1	Reach Determinations	10
5.2	Flood Hazard Factors	10
5.3	Flood Insurance Zones	11
5.4	Flood Insurance Rate Map Description	11
6.0	OTHER STUDIES	13
7.0	LOCATION OF DATA	13
8.0	REFERENCES AND BIBLIOGRAPHY	13

TABLE OF CONTENTS

			Page
9.0	REVISIONS DESCRIPTION		15
9.1	First Revision (Revised November 15, 1989)		15
a.	Acknowledgments		15
b.	Scope		15
c.	Hydrologic and Hydraulic Analyses		15
d.	Floodways		15
e.	Other Studies		16
f.	References and Bibliography		16

FIGURES

Figure	1	-	Vicinity Map	3
Figure	2	-	Floodway Schematic	8

TABLES

Table	1	-	Summary of Discharges	6
Table	2	-	Floodway Data	9
Table	3	-	Flood Insurance Zone Data	12

EXHIBITS

Flood Profiles

Chippewa Creek Panels 01P-02P

Flood Boundary and Floodway Map Index
Flood Boundary and Floodway Map

Flood Insurance Rate Map Index
Flood Insurance Rate Map

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study investigates the existence and severity of flood hazards in the City of Brecksville, Cuyahoga County, Ohio, and aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This study will be used to convert the City of Brecksville to the regular program of flood insurance by the Federal Insurance Administration (FIA). Local and regional planners will use this study in their efforts to promote sound flood plain management.

In some states or communities, flood plain management criteria or regulations may exist that are more restrictive or comprehensive than those on which these Federally-supported studies are based. These criteria take precedence over the minimum Federal criteria for purposes of regulating development in the flood plain, as set forth in the Code of Federal Regulations at 44 CFR, 60.1 (d). In such cases, however, it shall be understood that the state (or other jurisdictional agency) shall be able to explain these requirements and criteria.

1.2 Authority and Acknowledgements

The source of authority for this Flood Insurance Study is the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

The hydrologic and hydraulic analyses for this study were performed by Dalton-Dalton-Newport/Polytech, Inc., for the Federal Insurance Administration, under Contract No. H-4732. This study was completed in April 1979.

1.3 Coordination

The Consultation Coordination Officer, appointed by the FIA, organized the first community meeting on March 7, 1978. This meeting, attended by representatives of Brecksville, the FIA, the Ohio Department of Natural Resources (ODNR), and Dalton-Dalton-Newport/Polytech, Inc. was held to

and purpose of the Flood Insurance Study and to [illegible] limits of detailed and approximate study. A legal notice announcing the beginning of the study and stating its objectives was placed in the "Cleveland Plain Dealer" on August 18, 1978. The ODNR served as state coordinating agency for this study. Contact was maintained during the course of this study with the Mayor, the building inspector, and an engineer of Brecksville. A meeting was held on May 11, 1979, to discuss the results of the engineering study. This meeting was attended by representatives of the City of Brecksville and Dalton-Dalton-Newport/Polytech, Inc. Information provided by Brecksville officials has been incorporated into this study.

On December 10, 1979, the results of the work by the Study Contractor were reviewed and accepted at a final coordination meeting attended by representatives of Brecksville along with officials and representatives of the FIA, the ODNR, and Dalton-Dalton-Newport/Polytech, Inc.

2.0 AREA STUDIED

2.1 Scope of Study

This Flood Insurance Study covers the incorporated area of the City of Brecksville. The area of study is shown on the Vicinity Map (Figure 1).

The areas studied by detailed methods were selected with priority given to all known flood hazard areas, and areas of projected development or proposed construction for the next five years, through April 1984.

Approximate methods of analysis were used to study those areas having a low development potential or minimal flood hazards. The scope and methods of study were proposed to and agreed upon by the FIA and the City of Brecksville.

Floods caused by the overflow of Chippewa Creek from Old Royalton Road, about 200 feet downstream from the western corporate limit, to Chippewa Road crossing were studied in detail. Flooding on the rest of Chippewa Creek within Brecksville was studied by approximate methods. Flooding on the Cuyahoga River within the community of Brecksville was studied by approximate methods.

2.2 Community Description

Brecksville is located in the northeast portion of Ohio in the southern portion of Cuyahoga County. The total land area contained within the community limits is 19.6 square miles. The City of Brecksville is situated approximately 12 miles south of downtown Cleveland on State Route 21. Brecksville is bordered on the north by Independence, on the east by Sagamore Hills, on the south by Boston and Richfield, and on the west by Broadview Heights. According to U.S. Census Bureau figures, the population of Brecksville has increased from 5,435 in 1960 to 9,137 in 1970 (Reference 1).

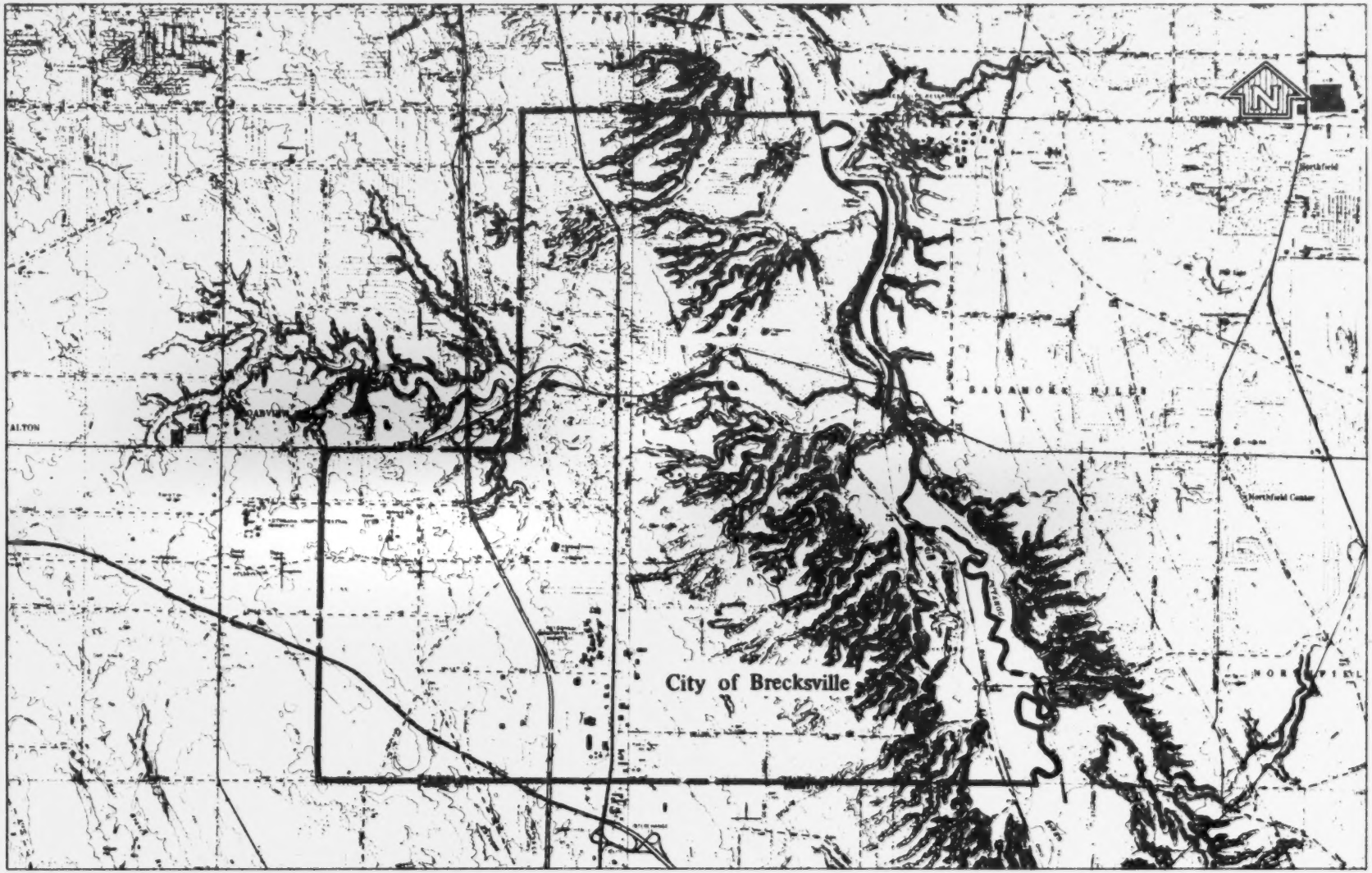


FIGURE 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF BRECKSVILLE, OH
(CUYAHOGA CO.)

APPROXIMATE SCALE

5714 0 5714 11,428 17,142 FEET

VICINITY MAP

The climate in northern Ohio is characteristically continental in nature with extreme heat and cold moderated by Lake Erie. Summer and winter temperatures range from a mean high of 73.7 degrees Fahrenheit (F.) in July to a mean low of 28.5 degrees F. in January, respectively, with a high of 103 degrees F. recorded in July 1941, and a low of -9 degrees F. recorded in December 1951. Annual average precipitation for the region is 32.8 inches with an average recorded snowfall of 50 inches. The precipitation is distributed throughout the year with the maximum being received in April (about 4 inches average) and the minimum in October (about 2.5 inches average). The maximum 24-hour rainfall was 3.73 inches recorded in May 1955, and the maximum 24-hour snowfall was 15.0 inches recorded in November 1950 (Reference 2).

Brecksville is in the glaciated plateau physiographic region of Ohio, and has a diverse soil composition. The flood plain of the Cuyahoga River and Chippewa Creek has deep, level, well-drained, recent alluvium soils of the Chagrin-Tioga-Euclid Association. Bordering the flood plain is a zone of deep, level to steep, well-drained, sandy and/or gravelly, glacially-deposited soils of the Oshtemo-Urban Land-Chile Association. Also bordering the flood plain area is an area of deep, very steep, well-drained, silt and clay, glacial lake deposition soils of the Geeburg-Mentor Association. Soils of the Brecksville-Hornell Association are found in central Brecksville in a zone running north to south. They are characteristically deep, sloping to steep, poorly to well-drained soils formed in shale bedrock. The southern and central portions of the community are occupied by the deep, level to steep, poorly to well-drained, silt and clay loam glacial till soils of the Mahoning-Ellsworth Association. West-central Brecksville has deep, level to sloping, poorly to well-drained, silt and clay loam glacial till soils of the Wadsworth-Rittman Association (Reference 3).

Chippewa Creek flows west to east through central Brecksville where it joins the Cuyahoga River at the eastern community boundary. It has a drainage area of 14.53 square miles upstream of Brecksville. Brecksville is 25 percent residential, 25 percent recreational and open space, 40 percent vacant land, and 10 percent industrial and agricultural. There is limited residential development in the Chippewa Creek flood plain with some commercial development near the State Route 21 crossing.

2.3 Principal Flood Problems

The past history of flooding on streams within Brecksville indicates that flooding may occur during any season of the year. The majority of major floods occurred during late winter and early spring and are usually the result of spring rains and/or snowmelt; however, summer cyclonic storms, moving out of the southwest, have produced rainfall of high intensity over the study area and contributed to sewer flooding problems in Brecksville. There has been no major recorded damage resulting from floods on Chippewa Creek.

2.4 Flood Protection Measures

No structural flood protection measures were found or are being planned in Brecksville. Nonstructural measures of flood protection are being utilized to aid in the prevention of flooding in Brecksville. These include periodic cleaning and maintenance of Chippewa Creek and roadside ditches.

3.0 ENGINEERING METHODS

For the flooding sources studied in detail in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Flood events of a magnitude which are expected to be equalled or exceeded once on the average during any 10-, 50-, 100-, or 500-year period (recurrence interval) have been selected as having special significance for flood plain management and for flood insurance premium rates. These events, commonly termed the 10-, 50-, 100-, and 500-year floods, have a 10, 2, 1, and 0.2 percent chance, respectively, of being equalled or exceeded during any year. Although the recurrence interval represents the long term average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than one year are considered. For example, the risk of having a flood which equals or exceeds the 100-year flood (one percent chance of annual occurrence) in any 50-year period is about 40 percent (four in ten), and for any 90-year period, the risk increases to about 60 percent (six in ten). The analyses reported here reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak discharge-frequency relationships for floods of the selected recurrence intervals for the flooding source studied in detail affecting the community.

Hydrologic analysis for ungaged streams in the study area was done using the method described in Bulletin No. 45, Floods in Ohio, Magnitude and Frequency (Reference 4). The procedures provided in Bulletin No. 45 calculate the peak flood discharges for storms of selected recurrence intervals using regression exponents for significant hydrologic and basin characteristics. These were developed by regional analysis using multiple regression techniques and datum from stream gages in areas of similar hydrologic characteristics. The Bulletin No. 45 procedures have been adapted to computer methods by the computer program HY 45 developed by Dalton-Dalton-Newport for use with FIA studies (Reference 5). This method is consistent with the hydrologic calculations currently being done by all state agencies.

Since hydrologic calculations for ungaged streams are based on streamflow records, they include consideration of both rainfall and snowmelt conditions and provide adequate consideration for multiple events. This procedure has been reviewed by the U.S. Geological Survey (USGS), and they agree that

adequate consideration for snowmelt has been provided. In areas of high density development, an urbanization factor was developed and applied to HY 45 calculations using the method of basin evaluation currently in use by the Ohio Department of Transportation (ODOT) (Reference 5). Chippewa Creek was studied by this method.

Peak discharges for the 10-, 50-, 100-, and 500-year floods of the flooding source studied in detail in the community are shown in Table 1.

TABLE 1 - SUMMARY OF DISCHARGES

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (SQ MILES)	PEAK DISCHARGE (CFS) 10-YEAR	50-YEAR	100-YEAR	500-YEAR
CHIPPEWA CREEK	14.53	1,946	3,042	3,591	4,919

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of the streams in the community were carried out to provide estimates of the elevations of the floods of the selected recurrence intervals along the flooding source studied in detail.

Cross sections for the backwater analyses of streams in the study area were obtained by field methods, including the below water portion of the section. All bridges, dams, and culverts were field surveyed to obtain elevation data and structural geometry.

Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles (Exhibit 1). For stream segments for which a floodway was computed (Section 4.2), selected cross section locations are also shown on the Flood Boundary and Floodway Map (Exhibit 2).

Channel roughness factors (Manning's "n") used in the hydraulic computations were chosen by engineering judgment and are based on field observations or by photogrammetric evaluation of oblique aerial photographs of selected areas in the community (Reference 6). The selected "n" values for Chippewa Creek were 0.028 for the channel and 0.05 for the overbank.

Starting water-surface elevations for Chippewa Creek were calculated using the slope-area method incorporated in the U.S. Army Corps of Engineers (COE) HEC-2 step-backwater computer program (Reference 7). Water-surface elevations of floods of the selected recurrence intervals were computed through use of the COE HEC-2 program (Reference 7). Flood profiles were drawn showing computed water-surface elevations for floods of selected recurrence intervals (Exhibit 1).

The hydraulic analyses for this study are based only on the effects of unobstructed flow. The flood elevations as shown on the profiles are, therefore, considered valid only if hydraulic structures, in general, remain unobstructed and if channel and overbank conditions remain essentially the same as ascertained during this study.

All elevations are referenced from National Geodetic Vertical Datum of 1929 (NGVD); elevation reference marks used in the study are shown on the maps.

4.0 FLOOD PLAIN MANAGEMENT APPLICATIONS

The National Flood Insurance Program encourages state and local governments to adopt sound flood plain management programs. Therefore, each Flood Insurance Study includes a flood boundary map designed to assist communities in developing sound flood plain management measures.

4.1 Flood Boundaries

In order to provide a national standard without regional discrimination, the 100-year flood has been adopted by the FIA as the base flood for purposes of flood plain management measures. The 500-year flood is employed to indicate additional areas of flood risk in the community. For each stream studied in detail, the boundaries of the 100-year and the 500-year floods have been delineated using the elevations determined at each cross section; between cross sections the boundaries were interpolated using topographic maps enlarged to a scale of 1:4800, with a contour interval of 10 feet, and supplemented by field survey data and observations (References 8 and 9). For the streams studied by approximate methods, the boundary of the 100-year flood was taken from the Flood Hazard Boundary Map (Reference 10), except where field observations and review of topography and discharges indicated that the boundaries be changed. In the latter case, the 100-year flood boundary is shown on the Flood Boundary and Floodway Map. No 500-year flood boundary was determined for the approximate method.

The boundaries of the 100- and 500-year floods are shown on the Flood Boundary and Floodway Map (Exhibit 2). Small areas within the flood boundaries may lie above the flood elevations and, therefore, not be subject to flooding; owing to lack of detailed topographical information or to limitations of the map scale, such areas are not shown. In cases where the 100-year and the 500-year flood boundaries are close together, only the 100-year boundary has been shown.

4.2 Floodways

Encroachment on flood plains, such as artificial fill, reduces the flood-carrying capacity, increases the flood heights of streams, and increases flood hazards in areas beyond the encroachment itself. One aspect of flood plain management involves balancing the economic gain from flood plain

development against the resulting increase in flood hazard. For purposes of the National Flood Insurance Program, the concept of a floodway is used as a tool to assist local communities in this aspect of flood plain management. Under this concept, the area of the 100-year flood is divided into a floodway and a floodway fringe. The floodway is the channel of a stream plus any adjacent flood plain areas that must be kept free of encroachment in order that the 100-year flood may be carried without substantial increases in flood heights. Minimum standards of the FIA limit such increases in flood heights to 1.0 foot, provided that hazardous velocities are not produced. In Ohio, though, under the Ohio Flood Plain Regulation Criteria, dated January 1976 (Reference 11), the encroachment in the flood plain is limited to that which will not cause an increase in stage of the 100-year flood of more than 0.5 foot (utilizing the "Equal Degree of Encroachment" principle). Because of the high velocities on Chippewa Creek, it was modeled as a supercritical stream. With this modeling, no surcharge was produced. Had a surcharge been produced, hazardous velocities would have resulted.

The floodways presented in this study were computed on the basis of equal conveyance reduction from each side of the flood plain. The results of the computations were tabulated at selected cross sections for each stream segment for which a floodway was computed (Table 2).

As shown on the Flood Boundary and Floodway Map (Exhibit 2), the floodway boundaries were determined at cross sections; between cross sections, the boundaries were interpolated. In cases where the boundaries of the floodway and the 100-year flood are either close together or collinear, only the floodway boundary has been shown.

The area between the floodway and the boundary of the 100-year flood is termed the floodway fringe. The floodway fringe thus encompasses the portion of the flood plain that could be completely obstructed without increasing the water-surface elevation of the 100-year flood more than 0.5 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to flood plain development are shown in Figure 2.

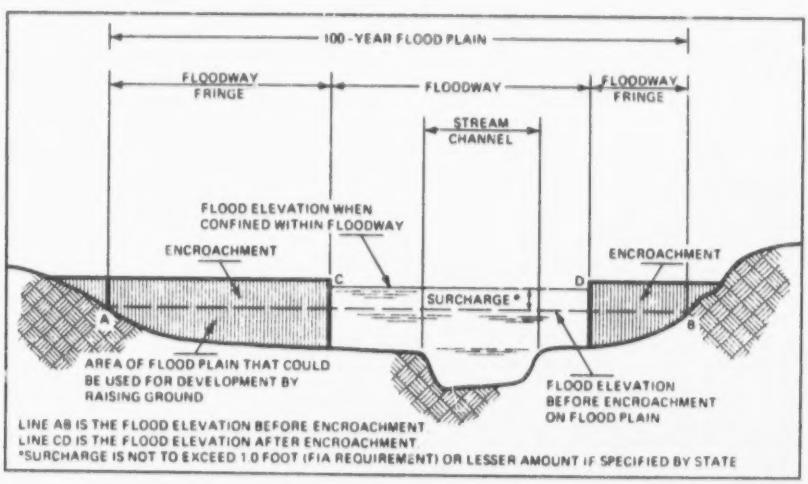

100-YEAR FLOOD PLAIN
FLOODWAY FRINGE
FLOODWAY
FLOODWAY FRINGE
STREAM CHANNEL
FLOOD ELEVATION WHEN CONFINED WITHIN FLOODWAY
ENCROACHMENT
ENCROACHMENT
C
D
SURCHARGE*
A
B
AREA OF FLOOD PLAIN THAT COULD BE USED FOR DEVELOPMENT BY RAISING GROUND
FLOOD ELEVATION BEFORE ENCROACHMENT ON FLOOD PLAIN
LINE AB IS THE FLOOD ELEVATION BEFORE ENCROACHMENT
LINE CD IS THE FLOOD ELEVATION AFTER ENCROACHMENT
*SURCHARGE IS NOT TO EXCEED 1.0 FOOT (FIA REQUIREMENT) OR LESSER AMOUNT IF SPECIFIED BY STATE

FIGURE 2 - Floodway Schematic

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/SEC.)	REGULATORY (FEET NGVD)	WITHOUT FLOODWAY (FEET NGVD)	WITH FLOODWAY (FEET NGVD)	INCREASE (FEET)
CHIPPEWA CREEK								
A	2505	73	491	7.3	*811.7	811.7	811.7	0.0
B	14,324	91	328	11.0	828.1	828.1	828.6	0.5
C	16,124	113	436	8.2	851.7	851.7	851.7	0.0
D	17,244	74	384	9.3	857.6	857.6	857.8	0.2
E	17,347	150	716	5.0	860.2	860.2	860.2	0.0
F	18,496	136	682	5.3	862.3	862.3	862.6	0.3
G	18,896	40	267	13.5	869.5	869.5	869.5	0.0
H	18,945	105	911	3.9	873.4	873.4	873.7	0.3

[1]FEET ABOVE MOUTH

REVISED: 11/15/89

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF BRECKSVILLE, OH
(CUYAHOGA CO.)

FLOODWAY DATA

CHIPPEWA CREEK

The floodways in this report are recommended to local agencies as minimum standards that can be adopted or that can be used as a basis for additional studies.

5.0 INSURANCE APPLICATION

In order to establish actuarial insurance rates, the FIA has developed a process to transform the data from the engineering study into flood insurance criteria. This process includes the determination of reaches, Flood Hazard Factors (FHF), and flood insurance zone designations for each flooding source affecting the City of Brecksville.

5.1 Reach Determinations

Reaches are defined as lengths of watercourses having relatively the same flood hazard, based on the average weighted difference in water-surface elevations between the 10- and 100-year floods. This difference does not have a variation greater than that indicated in the following table for more than 20 percent of the reach.

Average Difference Between 10- and 100-year Floods	Variation
Less than 2 feet	0.5 foot
2 to 7 feet	1.0 foot
7.1 to 12 feet	2.0 feet
More than 12 feet	3.0 feet

The locations of the reaches determined for the City of Brecksville are shown on the Flood Profiles (Exhibit 1) and are summarized in the Flood Insurance Zone Data Table (Table 3).

5.2 Flood Hazard Factors

The FHF is used to correlate flood information with insurance rate tables. Correlations between property damage from floods and their FHFs are used to set actuarial insurance premium rate tables based on FHFs from 005 to 200.

The FHF for a reach is the average weighted difference between the 10- and 100-year flood water-surface elevations expressed to the nearest 0.5 foot, and shown as a three-digit code. For example, if the difference between water-surface elevations of the 10- and 100-year floods is 0.7 foot, the FHF is 005; if the difference is 1.4 feet, the FHF is 015; if the difference is 5.0 feet, the FHF is 050. When the difference between the 10- and 100-year water-surface elevations is greater than 10.0 feet, accuracy for the FHF is to the nearest foot.

5.3 Flood Insurance Zones

After the determination of reaches and their respective FHFs, the entire incorporated area of the City of Brecksville was divided into zones, each having a specific flood potential or hazard. Each zone was assigned one of the following flood insurance zone designations:

Zone A:	Special Flood Hazard Areas inundated by the 100-year flood, determined by approximate methods; no base flood elevations are shown or FHFs determined.
Zone A2:	Special Flood Hazard Areas inundated by the 100-year flood, determined by detailed methods; base flood elevations are shown, and zones subdivided according to FHF.
Zone B:	Areas between the Special Flood Hazard Area and the limits of the 500-year flood, including areas of the 500-year flood plain that are protected from the 100-year flood by dike, levee, or other water control structure; or areas subject to certain types of 100-year shallow flooding where depths are less than 1.0 foot; and areas subject to 100-year flooding from sources with drainage areas less than 1 square mile. Zone B is not subdivided.
Zone C:	Areas of minimal flooding.

Table 3, "Flood Insurance Zone Data," summarizes the flood elevation differences, FHFs, flood insurance zones, and base flood elevations for the flooding source studied in detail in the community.

5.4 Flood Insurance Rate Map Description

The Flood Insurance Rate Map for the City of Brecksville is, for insurance purposes, the principal result of the Flood Insurance Study. This map (published separately) contains the official delineation of flood insurance zones and base flood elevation lines. Base flood elevation lines show the locations of the expected whole-foot water-surface elevations of the base (100-year) flood. This map is developed in accordance with the latest flood insurance map preparation guidelines published by the FIA.

FLOODING SOURCE	PANEL[1]	ELEVATION DIFFERENCE[2] BETWEEN 1.0% (100-YEAR) FLOOD AND			FLOOD HAZARD FACTOR	ZONE	BASE FLOOD ELEVATION[3] (NGVD)
		10% (10-YEAR)	2% (50-YEAR)	0.2% (500-YEAR)			
CHIPPEWA CREEK REACH 1	0004	-2.01	-0.69	1.07	020	A4	VARIES–SEE MAP

[1]FLOOD INSURANCE RATE MAP PANEL
[2]WEIGHTED AVERAGE
[3]ROUNDED TO NEAREST FOOT

REVISED 11/15/89

TABLE 3

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF BRECKSVILLE, OH
(CUYAHOGA CO.)

FLOOD INSURANCE ZONE DATA

CHIPPEWA CREEK

6.0 OTHER STUDIES

A Flood Insurance Study for the adjacent community of Independence agrees with this study (Reference 12).

A Flood Hazard Boundary Map has been published by the Federal Insurance Administration (Reference 10). The differences between the Flood Hazard Boundary Map and this study are justified due to the more detailed nature of this Flood Insurance Study.

This report either supersedes or is compatible with all previous studies published on streams studied in this report and should be considered authoritative for the purposes of the National Flood Insurance Program.

7.0 LOCATION OF DATA

Survey, hydrologic, hydraulic and other pertinent data used in this study can be obtained by contacting the Insurance and Mitigation Division, Federal Emergency Management Agency, One North Dearborn Street, Chicago, Illinois 60602.

8.0 REFERENCES AND BIBLIOGRAPHY

1. U.S. Department of Commerce, Bureau of the Census, 1970 Census of Population, Number of Inhabitants, Ohio, August 1971.

2. ----------, National Oceanic and Atmospheric Administration, Climates of the States, 1974.

3. U.S. Department of Agriculture, Ohio Department of Natural Resources, Soil Survey, Cuyahoga County, Ohio, November 1974.

4. Ohio Department of Natural Resources, Bulletin No. 45, Floods in Ohio, Magnitude and Frequency, Earl E. Webber and William P. Bartlett, Jr., May 1977.

5. Dalton-Dalton-Newport/Polytech, Inc., Computer Program HY 45, 1977.

6. ----------, Oblique Aerial Photographs, Scale 1:2400, Contour Interval two feet: November 1978.

7. U.S. Army Corps of Engineers, Hydrologic Engineering Center, Generalized Computer Program, HEC-2: Water-Surface Profiles, Davis, California, November 1967, (updated) August 1977.

8. U.S. Geological Survey, Topographic Maps, Scale 1:24000, Contour Interval 10 feet: Northfield Quadrangle, 1967.

9. ----------, Topographic Maps, Scale 1:24000, Contour Interval 10 feet: Broadview Heights Quadrangle, 1963.

10. U.S. Department of Housing and Urban Development, Federal Insurance Administration, Flood Hazard Boundary Map, City of Brecksville, Ohio, February 1974, (revised) July 1976.

11. Ohio Department of Natural Resources, Division of Water Resources, Ohio Flood Plain Regulation Criteria,January 1976.

12. Federal Emergency Management Agency, Federal Insurance Administration. Flood Insurance Study, City of Independence, Ohio, (in progress).

Chow, Ven Te, Handbook of Applied Hydrology. New York: McGraw-Hill Book Company, Inc., 1964.

King, Horace W., and Ernest F. Brater, Handbook of Hydraulics, 5th Edition. New York: McGraw-Hill Book Company , Inc., 1974.

Lonegran, James (Publisher), and Roberta Brooks (Editor), Ohio Almanac 1974. The Lorain Journal Company, 1973.

Ohio Department of Natural Resources, Ohio Flood Plain Regulation Criteria, January 1976.

Simon, Andrew L., Practical Hydraulics. New York: John Wiley & Sons, 1976.

U.S. Department of Agriculture, Soil Conservation Service, Guide for Selecting Roughness Cofficient "n" Values For Channels, Guy B. Fasken, December 1963.

U.S. Geological Survey, State of Ohio, Surface Water Records, Water Resources Data for Ohio, Part 1, 1973.

9.0 REVISIONS DESCRIPTION

This section has been added to provide information regarding significant revisions made since the original Flood Insurance Study was printed. Future revisions may be made that do not result in the republishing of the Flood Insurance Study report. To assure that any user is aware of all revisions, it is advisable to contact the community repository of flood hazard data located at the Office of the Building Department, City of Brecksville, Ohio.

9.1 First Revision (Revised November 15, 1989)

a. Acknowledgments

The hydraulic analyses for this revision were performed by Greenhorne & O'Mara, Inc. The Federal Emergency Management Agency reviewed and accepted the analyses for the purposes of this revision.

b. Scope

Chippewa Creek was revised from Chippewa Road to the upstream crossing of Old Royalton Road. The base flood elevations, Special Flood Hazard Area, and floodway for Chippewa Creek were revised for this reach.

c. Hydrologic and Hydraulic Analyses

Hydrologic data for Chippewa Creek were obtained from the original Flood Insurance Study and used without modification.

Revised hydraulic analyses were performed using the HEC-2 step-backwater computer program (Reference 13) in the subcritical flow regime, whereas in the original Flood Insurance Study the same reach was modeled using the supercritical flow option. The ground elevation data for all cross sections in the hydraulic model between and including cross sections B and C were adjusted (increased) to agree with detailed topographic data supplied by the City of Brecksville (Reference 14). The hydraulic modeling of the two Old Royalton Road bridges and the Chippewa Road bridge was revised to better reflect the effective flow through bridge openings.

d. Floodways

Floodway computations for Chippewa Creek were amended as a result of the revised hydraulic analyses. The floodway was computed on the basis of equal conveyance reduction from each side of the floodplain. The results of these computations were tabulated at selected cross sections for each stream segment for which a floodway was revised and are presented in Table 2, Floodway Data.

e. Other Studies

This revision affects only the incorporated areas of the City of Brecksville, Ohio. The published Flood Insurance Studies for the City of Broadview Heights (Reference 15) and Summit County (Reference 16) are in agreement with this revised Flood Insurance Study.

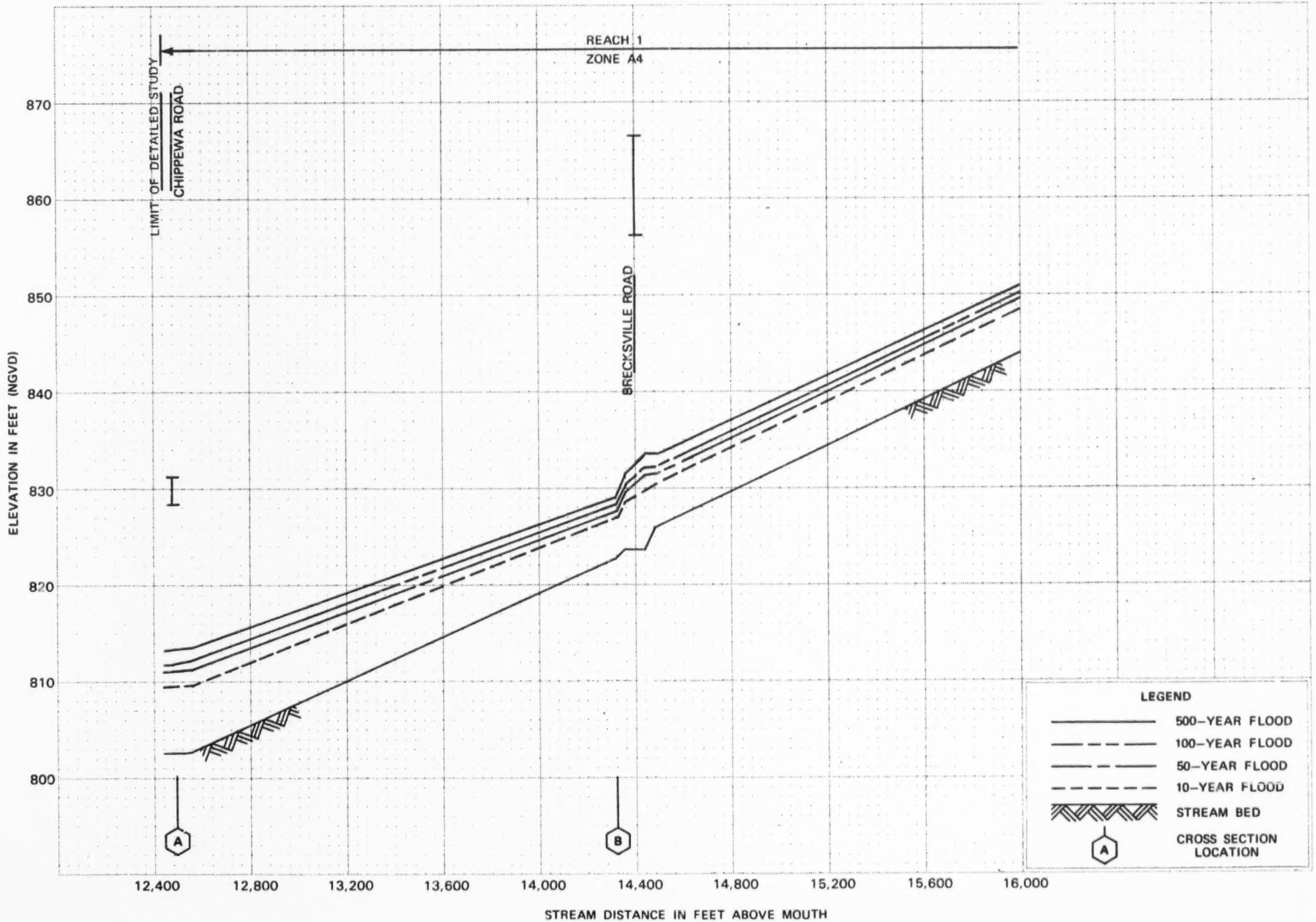
f. References and Bibliography

13. U.S. Army Corps of Engineers, Hydrologic Engineering Center, HEC-2 Water Surface Profiles, Computer Program 723-X6-L202A, Davis, California, April 1984.

14. Graphco Company, Topographic Map, County of Cuyahoga, Scale 1:2400, Contour Interval 2 Feet: City of Brecksville, Cuyahoga County, Ohio, 1978.

15. U.S. Department of Housing and Urban Development, Federal Insurance Administration, Flood Insurance Study, City of Broadview Heights, Cuyahoga County, Ohio, March 1979.

16. Federal Emergency Management Agency, Federal Insurance Administration, Flood Insurance Study, Summit County, Unincorporated Areas, Ohio, April 1981.



FLOOD PROFILES

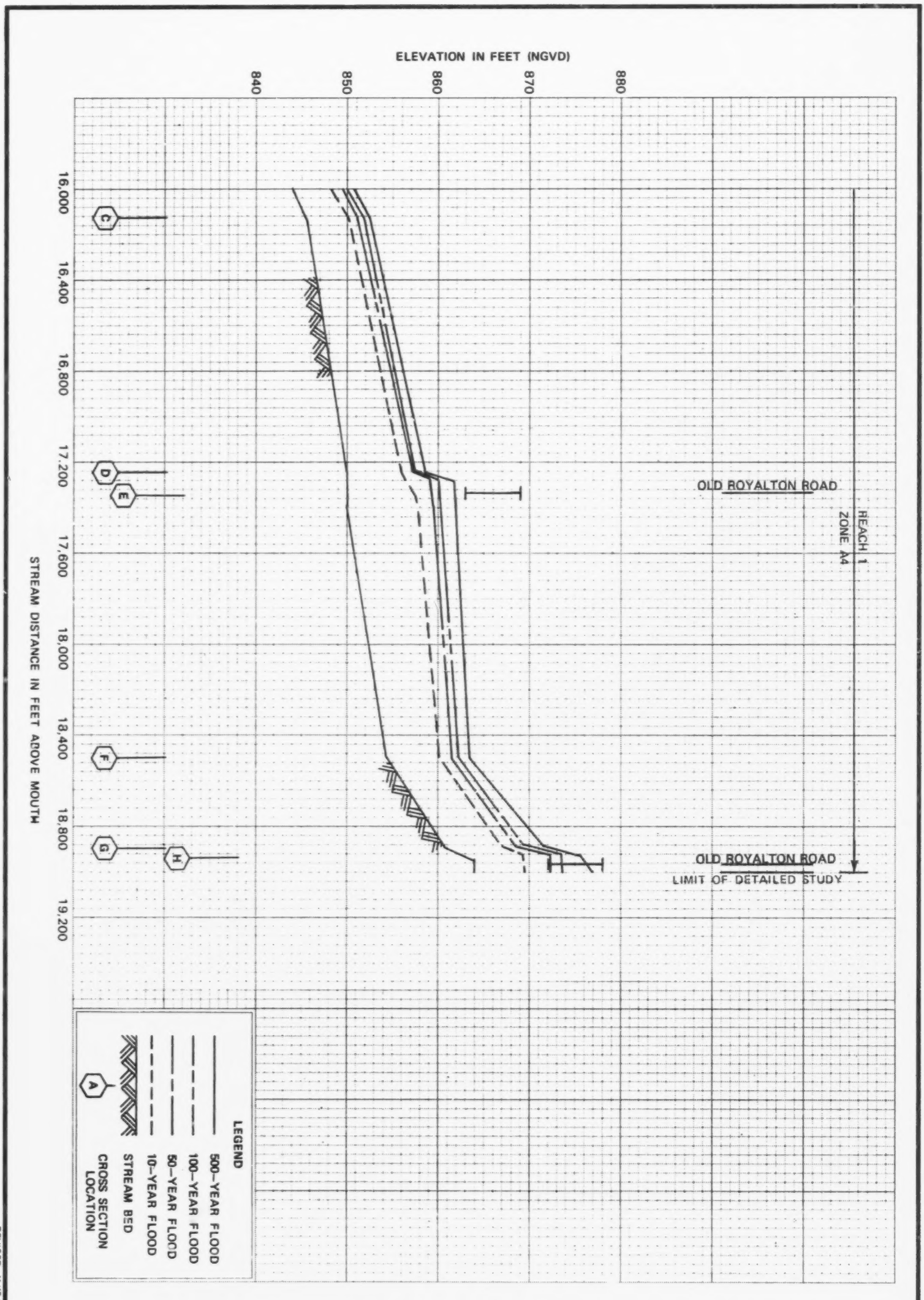
CHIPPEWA CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF BRECKSVILLE, OH
(CUYAHOGA CO.)

01P

REVISED: 11/15/88



02P

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF BRECKSVILLE, OH

(CUYAHOGA CO.)

FLOOD PROFILES

CHIPPEWA CREEK